

Amendments to the Drawings:

The attached drawing pages include the following:

Replacement Sheets

APR 30 2007

Remarks:

Applicants have carefully studied the non-final Examiner's Action mailed 01/31/2007, having a shortened statutory period for response set to expire 04/30/2007, and all references cited therein. The amendment appearing above and these explanatory remarks are believed to be fully responsive to the Action. Accordingly, this important patent application is now believed to be in condition for allowance.

Applicants respond to the outstanding Action by centered headings and numbered paragraphs that correspond to the centered headings and paragraph numbering employed by the Office, to ensure full response on the merits to each finding of the Office.

Specification

1. The specification has been checked and minor errors have been corrected. This application was not filed electronically so instead of amending paragraphs in accordance with electronic filing practice, the former practice of identifying changes by page and line number has been followed. Most of the errors relate to a confusing mixture of words that refer to the object being scanned, such as "subject surface," "subject object," "surface," "surface or object," "portion," and "material." Formal drawings are also enclosed herewith.

Claim Rejections – 35 U.S.C. § 102

2. Applicants acknowledge the quotation of 35 U.S.C. § 102(b).
3. Claims 1-5, 9-12, 17-21, 30, 33-36, and 41-42 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Heckman et al. (hereinafter "Heckman"). Reconsideration and withdrawal of this ground of rejection is requested for the reasons that follow.

The Office contends that Heckman discloses a 3-D imaging system adapted for remote information acquisition. Applicants respectfully traverse this finding of the Office. Heckman discloses a 2-D imaging system adapted for remote information acquisition. A three dimensional imaging system is not mentioned by Heckman nor does Heckman offer any teachings or suggestions as to how the disclosed two dimensional imaging system could be modified to provide three dimensional imaging. Therefore, claims 1-5, 9-12, 17-21, 30, 33-36, and 41-42 do not require amendment to define over Heckman.

The Office further contends that Heckman discloses a platform for supporting and conveying the 3-D imaging system; applicants agree that Heckman discloses a platform for supporting and conveying an imaging system, but not a 3-D imaging system.

The Office also contends that Heckman discloses an illumination source adapted to transmit light to an object surface and that said illumination source is affixed to said platform; Applicants agree that Heckman discloses an illumination source adapted to transmit light to an object surface and that said illumination source is affixed to a platform for supporting and conveying a 2-D imaging system.

Heckman further discloses, according to the Office, a light detector, affixed to the platform, that is adapted to collect the light reflected back from the object surface. Applicants agree that Heckman discloses a light detector, affixed to a platform for supporting and conveying a 2-D imaging system, that is adapted to collect light reflected back from the object surface.

The Office's final contention in connection with these claim is that Heckman discloses a data processing system in communication with the light detector for compiling data obtained from the reflected light to produce an image therefrom by using an algorithm $R = S \cdot \tan \left(\phi + \frac{\text{row\#} \cdot F.O.V.}{\text{totalrows}} \right)$. Applicants agree that Heckman discloses a data processing system in communication with the light detector for compiling data obtained from the reflected light to produce a 2-D image therefrom by using an algorithm that neither teaches nor suggests the algorithm disclosed by applicants.

More particularly, Heckman's algorithm is $p(\Theta) = 4/3 (f/d/R) \cos \Theta$. Quantity $p(\Theta)$ is the polar plot of the irradiance incident upon a photomultiplier tube faceplate, *i.e.*, with the plane in polar coordinates. The fraction $4/3$ is the ratio of the index of refraction of water to air. F is the focal length of the lens in meters, d is the separation distance in meters between the transmitting and receiving mirrors, R is the perpendicular distance in meters to the ocean bottom, and (Θ) is the sweep angle in radians.

Applicants' algorithm does not include a polar (or rectangular) plot of the irradiance incident upon the faceplate of a photomultiplier tube. Nor does applicants' algorithm include the ratio of the index of refraction of water to air, nor does it rely upon the focal length of the lens in meters.

The only common ground between the respective algorithms of Heckman and applicants is that both include the distance between the source of illumination and the detector (said distance being denoted "d" by Heckman and "S" by applicants, although Heckman's distance "d" is more particularly disclosed as the distance between the transmitting and receiving mirrors). The quantity "R" in Hickman's algorithm is not the same as "R" in applicants' algorithm because Hickman defines "R" as the perpendicular distance to the ocean bottom in meters whereas applicants' "R" is the distance between the illumination source and the object being scanned, as distinguished from the ocean bottom, and without restriction to the instantaneous moment that said source of illumination and object are in perpendicular relation to one another.

In sharp, distinct, and patentable contrast to the Heckman algorithm, applicants' algorithm relies upon the tangent of the angle between the illumination beam and the field of view of a digital camera, the total number of vertical imaging elements or pixels, and the row where a line is detected.

The novel algorithm relates geometry of the instrument configuration to accurately calculate the height, width and length of scanned objects. This has nothing to do with light intensity, wavelength or scattering. The referenced equation from Heckman is used to quantify the amount of light (irradiance) incident on the detector. The only information about the object that can be determined from this type of equation is reflectance. Geometrical properties of the object cannot be deduced from such a calculation. Since irradiance is a function of distance from the object to the sensor, there are terms common to both algorithms. But the end use of the variables is very different.

Moreover, the system described by Heckman is a scanning system. That is, the image is formed by physically moving the laser beam and using many reads from a single-element detector to construct an image. The novel system uses no moving parts. It is not a scanner in the traditional sense. The fan beam is generated optically, rather than by moving a laser point back and forth. Also, the novel detector includes 640x480 elements, not a single element.

Claim Rejections – 35 USC § 103

4. Applicants acknowledge the quotation of 35 U.S.C. § 103(a).

5. Claims 6-8, 22-24, and 37-39 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Heckman in view of Cabib et al. (hereinafter "Cabib"); reconsideration and withdrawal of this ground of rejection is requested because claims 6-8, 22-24, and 37-39 ultimately depend from claim 1, currently amended.

6. Claims 13-16, 29-32, and 43-46 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Heckman; reconsideration and withdrawal of this ground of rejection is requested because claims 13-16, 29-32, and 43-46 ultimately depend from claim 1, currently amended.

7. Claim 40 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Heckman in view of Ulich et al. (hereinafter "Ulich"); reconsideration and withdrawal of this ground of rejection is requested because claim 40 ultimately depends from claim 1, currently amended.

Conclusion

8. Applicants agree that the art made of record and not relied upon is not more pertinent to the claimed invention than the art cited.

9. If the Office is not fully persuaded as to the merits of Applicants' position, or if an Examiner's Amendment would place the pending claims in condition for allowance, a telephone call to the undersigned at (813) 925-8505 is requested. Applicants thank the Office for its careful examination of this important patent application.

Very respectfully,
SMITH & HOPEN

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Dated: April 30, 2007

pc: The University of South Florida

CERTIFICATE OF FACSIMILE TRANSMISSION
(37 C.F.R. 1.8)

I HEREBY CERTIFY that this Amendment A, including Introductory Comments, Amendments to the Specification, Amendments to the Claims, Amendments to the Drawings and Remarks, is being transmitted by facsimile to the United States Patent and Trademark Office, Art Unit 2621, Attn: Anand Shashikant Rao, (571) 271-8300 on April 30, 2007.

Dated: April 30, 2007

April Turley
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